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**SEVERITY OF BASELINE CARTILAGE DAMAGE IN THE KNEE AND RISK OF PROGRESSION – THE MOST STUDY**

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**Purpose:** Several joint specific tissue alterations have been identified that are predictors of subsequent cartilage loss in the knee. Of these, several studies suggest that one of the strongest predictors is prevalent cartilage damage. It is unknown which grades of cartilage damage progress most rapidly in comparison to areas of intact cartilage. Aims were to assess the risk of progressive cartilage loss for subregions with different grades of baseline cartilage damage severity in the knee and also to define the baseline grade at highest risk for progression. **Methods:** The Multicenter Osteoarthritis (MOST) Study is a longitudinal observational study of subjects with knee OA or at risk of developing OA. The MRI protocol included axial and sagittal proton density-weighted fat-suppressed and a coronal STIR sequence (1.0 T extremity system). MRIs were assessed semiquantitatively according to the modified WOMBS scoring system, where cartilage is assessed on a scale from 0 to 6. Included were all knees with available baseline and 30 months WOMBS scores. A knee was defined as having experienced cartilage loss if any cartilage score increased by a within-grade change at any subregion over the follow-up period. We examined the relation of cartilage damage at baseline (score >1) as well as severity of cartilage damage to the risk of cartilage loss at 30 months using logistic regression models for whole knee, for the tibio-femoral and for the patello-femoral joints separately. Subregions with adjacent pathology (i.e. bone marrow lesions, meniscal damage and meniscal extrusion) were analyzed separately from those without such pathology. In the regression model we adjusted for baseline

Cartilage morphology status	Subregions without adjacent pathology			Subregions with adjacent pathology		
	TF and PF <sup>1</sup>	TF <sup>1</sup>	PF <sup>2</sup>	TF <sup>1</sup> and PF <sup>2</sup>	TF <sup>1</sup>	PF <sup>2</sup>
Reference: Grade 0 and 1 combined: Subregions with cartilage loss at FU (%)	262/10110 (2.6)	180/7286 (2.5)	82/2824 (2.9)	187/2586 (7.2)	172/2461 (7.0)	15/125 (12.0)
aOR <sup>3</sup>	1.0	1.0	1.0	1.0	1.0	1.0
95% CI	(reference)	(reference)	(reference)	(reference)	(reference)	(reference)
p						
Grade 2.0: Subregions with cartilage loss at FU (%)	102 / 518 (19.7)	66/ 292 (22.6)	36/226 (15.9)	99/268 (34.7)	67/184 (36.4)	26/84 (31.0)
aOR <sup>3</sup>	9.38	11.3	6.65	6.99	7.74	3.15
95% CI	(7.12,12.36)	(8.06,16.0)	(4.30,10.29)	(5.12,9.53)	(5.43,11.06)	(1.56,6.35)
p	<.0001*	<.0001*	<.0001*	<.0001*	<.0001*	0.0013*
Grade 2.5: Subregions with cartilage loss at FU (%)	14/127 (11.0)	11/103 (10.7)	3/24 (12.5)	25/86 (29.1)	23/70 (32.9)	2/16 (12.5)
aOR <sup>3</sup>	4.90	4.89	5.00	5.22	6.49	1.13
95% CI	(2.67,8.64)	(2.49,9.38)	(1.44,17.39)	(3.11,8.78)	(3.67,11.48)	(0.23,5.53)
p	<.0001*	<.0001*	0.01*	<.0001*	<.0001*	0.88
Grade 3: Subregions with cartilage loss at FU (%)	173/1558 (11.1)	106/753 (14.1)	67/805 (8.3)	395/1686 (23.4)	321/1220 (26.1)	74/456 (16.2)
aOR <sup>3</sup>	4.70	6.53	3.02	3.76	4.38	1.52
95% CI	(3.70,5.98)	(4.78,9.38)	(2.10,4.34)	(3.01,4.70)	(3.44,5.57)	(0.85,2.71)
p	<.0001*	<.0001*	<.0001*	<.0001*	<.0001*	0.16
Grade 4: Subregions with cartilage loss at FU (%)	12/55 (21.8)	1/9 (11.1)	11/46 (23.9)	16/59 (27.1)	10/40 (25.0)	6/19 (31.6)
aOR <sup>3</sup>	10.86	4.94	11.03	4.14	3.43	3.66
95% CI	(5.51,20.64)	(0.80,30.58)	(5.37,23.08)	(2.28,7.50)	(1.62,7.27)	(1.17,11.47)
p	<.0001*	0.09	<.0001*	<.0001*	0.01*	0.03*
Grades 5 and 6 combined: Subregions with cartilage loss at FU (%)	29/337 (8.6)	11/148 (7.4)	18/189 (9.5)	200/1435 (13.9)	151/948 (15.9)	49/487 (10.1)
aOR <sup>3</sup>	3.51	3.27	3.45	1.89	2.18	0.98
95% CI	(2.28,5.41)	(1.60,6.71)	(1.96,6.09)	(1.46,2.44)	(1.62,2.92)	(0.52,1.84)
p	<.0001*	0.001	<.0001*	<.0001*	<.0001*	0.95

\* significant at p < 0.05  
<sup>1</sup> adjacent pathology: meniscal damage and/or meniscal extrusion and/or bone marrow lesion  
<sup>2</sup> adjacent pathology: bone marrow lesion  
<sup>3</sup> adjusted for age, gender, BMI, malalignment, radiographic OA severity, synovitis, effusion  
TF: tibio-femoral, PF: patello-femoral, FU: follow-up, aOR: adjusted odds ratio, 95% CI: 95% confidence interval

Fig. 1. Risk of cartilage loss at 30 months for subregions with normal cartilage and with different grades of prevalent baselines damage severity.

effusion, synovitis, BMI, age, gender, radiographic osteoarthritis severity and malalignment.

**Results:** Altogether 18825 subregions of 1367 knees were included. Of these at baseline 786 (4.2%) showed small focal superficial defects (=grade 2), 213 (1.1%) exhibited small focal full thickness defects (=grade 2.5), 3244 (17.2%) showed widespread superficial damage <75% of subregion (=grade 3), 28 (0.1%) exhibited diffuse superficial damage >75% of subregion (=grade 4) and 1772 (9.4%) showed diffuse full thickness cartilage loss (grades 5 and 6). 6120 (32.5%) subregions exhibited adjacent pathology. Altogether 1508 (8.0%) subregions showed progressive cartilage loss at follow-up. Risk of progressive cartilage loss was markedly increased for subregions with any grade of prevalent cartilage damage (Figure 1) compared to subregions without prevalent damage. In subregions without adjacent pathology, focal superficial defects showed the highest risk of subsequent cartilage loss (adjusted odds ratio [aOR] 9.4, 95% confidence interval [95% C] 7.0–12.1). Results were comparable for subregions with adjacent subregional pathology. For subregions with adjacent BMLs in the patellofemoral joint, only those with small superficial defects (grade 2.0) showed an increased risk (aOR 3.15, 95% CI 1.56–6.35). **Conclusions:** In comparison to subregions without cartilage damage, the risk of subsequent cartilage loss is markedly increased for subregions with prevalent damage regardless of adjacent pathology. Small superficial defects have the highest risk of further deterioration in the tibio-femoral and patello-femoral joints. Treatment of focal cartilage defects to avoid further cartilage loss in the same subregion might be worth consideration regardless of location and adjacent pathology.

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**IMPACT OF ADJACENT ARTICULAR PATHOLOGY IN REGARD TO SUBSEQUENT CARTILAGE LOSS IN THE TIBIO-FEMORAL JOINT – A SUBREGIONAL ANALYSIS FROM THE MOST STUDY**

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**Purpose:** One of the strongest predictors of subsequent cartilage loss is prevalent cartilage damage. Abnormally loaded areas of the knee joint are at increased risk of cartilage loss, and subchondral bone marrow lesions (BMLs) are likely markers for areas of such abnormal loading. Meniscal damage and extrusion may cause increased ipsi-compartmental loading regardless of alignment. Thus, ipsi-compartmental meniscal damage and extrusion and prevalent BMLs may be considered markers for increased load to an adjacent cartilage subregion. The aim was to evaluate the impact of directly underlying BMLs and meniscal damage (called ‘adjacent’) pathology on the risk of subsequent cartilage loss at 30 months follow-up stratified by baseline cartilage damage severity. **Methods:**

The Multicenter Osteoarthritis (MOST) Study is a longitudinal observational study of subjects with knee osteoarthritis (OA) or at risk of developing OA. The MRI protocol (1.0 T) included axial and sagittal proton density-weighted fat-suppressed fast spin-echo and a coronal STIR sequence. MRIs were assessed semiquantitatively according to the modified WOMBS scoring system (0–6). Included were all knees with available baseline and 30 months MRI readings of the tibio-femoral joint (10 subregions). Ordinal logistic regression was used to estimate the risk of cartilage loss in each subregion, stratified by the severity of baseline cartilage damage. Cartilage loss was defined as at least within-grade progression in the same subregion. Subregions with adjacent articular pathology were stratified in subregions with one, two or three adjacent risk factors (i.e. meniscal damage, meniscal extrusion and BMLs). Subregions without adjacent pathology but with the same degree of prevalent cartilage damage (graded from 0 to 6) were the reference. Additional adjustment was performed for possible confounders, i.e. baseline effusion, synovitis, body mass index, age, gender, radiographic osteoarthritis severity and malalignment. **Results:** 13524 subregions of 1365 knees were included. Subregional baseline cartilage scores were distributed as follows: grade 0: 9747 (72.1%); grade 2: 476 (3.5%); grade 2.5: 173 (1.3%); grade 3: 1983 (14.7%); grade 4: 49 (0.4%); grades 5 and 6 combined: 1096 (8.1%). 1119 (8.3%) subregions showed progressive cartilage loss at follow up.